

REMARKS

In view of the above amendments and the following remarks, reconsideration of the rejections set forth in the Office Action of April 16, 2003 is respectfully requested.

In order to make necessary editorial corrections, the entire specification and abstract have been reviewed and revised. As the revisions are quite extensive, the amendments to the specification and abstract have been incorporated into the attached substitute specification and abstract. No new matter has been added by the revisions. Entry of the substitute specification is thus respectfully requested.

The Examiner has rejected claims 1-8 under 35 USC § 112, second paragraph, as being indefinite. In particular, the Examiner asserts that the alternative terminology recited in original claim 1, as well as various other phrases used throughout the claims, render the scope of the claims unclear. In view of these rejections, claims 1-8 have now been cancelled as indicated above, and new claims 9-21, including new independent claims 9 and 18, have been submitted. The new claims have been carefully drafted so as to address each of the specific matters raised by the Examiner, as well as to comply with all of the requirements of 35 USC § 112. Accordingly, it is respectfully submitted that the Examiner's rejections under § 112 are not applicable to the new claims.

The Examiner has rejected original claims 1-4 as being anticipated by the Isoyama reference (JP 63-169365); has rejected claims 1, 2, 4, and 6 as being anticipated by the Bader reference (USP 4,475,983); has rejected claim 7 as being anticipated by the Takahashi reference (USP 4,079,720); has rejected claims 7 and 8 as being anticipated by the Liechti reference (EP 622476); and has rejected claim 5 as being unpatentable over the Isoyama reference in view of the Farnworth reference (USP 5,487,999). However, as indicated above, original claims 1-8 have been cancelled and replaced with new claims 9-21. The new claims have been drafted in order to address the formal rejections as discussed above, and also in order to clarify the original claims. Therefore, for the reasons discussed below, it is respectfully submitted that new claims 9-21 are clearly patentable over the prior art of record.

New independent claim 9 is directed to a method of forming vehicle components, comprising providing at least one of a brake disc and a clutch plate, and integrally forming a friction member on

each of the brake disc and/or clutch plate. The friction member is formed of a PMMC material including an Al-alloy matrix material and ceramic reinforcement particles embedded in the matrix material. A transfer layer is formed on a friction surface of the friction member, and the formation of the transfer layer includes removing the top surface layer of the matrix material so as to expose a surface of the ceramic reinforcing particles to thereby increase a friction coefficient of the friction surface of the friction member.

Brake discs and clutch plates of automotive vehicles are known to generate high temperatures during operation due to friction forces, and these high temperatures can potentially cause warping or other deformation. As explained in the present specification, however, providing a transfer layer on a friction member integrally formed on a brake disc or a clutch plate, in which the transfer layer includes an exposed surface of embedded ceramic reinforcing particles in the friction member, prevents softening or deformation at elevated temperatures. Thus, the reliability and performance of the brake disc and/or the clutch plate is improved. In addition, because the transfer layer is formed by removing the top surface layer of matrix material, a homogenous and extremely reliable transfer layer is formed quickly and efficiently.

The Isoyama reference is directed to an aluminum material sheet with a high coefficient of friction, which is to be used as a roller for paper in a copying machine. In particular, the Isoyama reference discloses a sheet formed of a base aluminum matrix material, and metal particles embedded within the matrix material. A surface of the sheet is etched with an acid solution to partially dissolve the sheet so that the metal particles project from the matrix material. However, the Isoyama reference does not disclose or suggest forming a friction member of a PMMC material including an Al-alloy matrix material and *ceramic* reinforcing particles embedded in the matrix material. Moreover, the Isoyama reference also does not disclose or suggest integrally forming the friction member on a brake disc and/or a clutch plate. Accordingly, it is submitted that the Isoyama reference does not anticipate or even suggest the invention recited in new independent claim 9.

The Bader reference discloses a composite electrical contact material, including a conductive metal matrix material and conductive particles embedded within the metal matrix material. As explained in column 3, lines 56-68 of the Bader reference, the particles are metals, intermetallics, or

phosphides of metals. However, it is respectfully submitted that the Bader reference does not disclose or suggest forming a friction member of an Al-alloy matrix material and *ceramic* reinforcing particles embedded in the matrix material. Moreover, the Bader reference also does not disclose or suggest integrally forming the friction member on each of a brake disc and/or a clutch plate. Accordingly, it is respectfully submitted that the Bader reference does not anticipate or even suggest the invention recited in new independent claim 9.

The Takahashi reference is directed to a combination of a cylinder and a seal ring, in which the wear surfaces are formed of an aluminum alloy matrix and silicon particles embedded in the matrix. However, the Takahashi reference also does not disclose or suggest integrally forming a friction member on each of a brake disc and/or a clutch plate, and does not disclose or suggest forming the friction member of a PMMC material including an Al-alloy matrix material and ceramic reinforcing particles embedded in the matrix material. Accordingly, it is submitted that the Takahashi reference does not anticipate or even suggest the invention recited in new independent claim 9.

The Liechti reference discloses the formation of a surface layer on PMMC material by a laser. However, the Liechti reference also does not disclose or suggest integrally forming a friction member on a brake disc and/or a clutch plate, and does not disclose or suggest forming the friction member of a PMMC material including an Al-alloy matrix material and ceramic reinforcing particles embedded in the matrix material. Accordingly, it is submitted that the Liechti reference also does not anticipate or even suggest the invention recited in new independent claim 9.

The Farnworth reference discloses a method for fabricating a penetration limited contact, and the Examiner asserts that the Farnworth reference teaches that NaOH and KOH are effective aluminum etchants. However, the Farnworth reference does not disclose a friction member integrally formed on a brake disc and/or a clutch plate, and does not disclose or suggest forming the friction member of a PMMC material including an Al-alloy matrix material and ceramic reinforcing particles embedded in the matrix material. Accordingly, it is submitted that the Farnworth reference also does not anticipate or even suggest the invention recited in new independent claim 9.

As explained above, the Isoyama reference, the Bader reference, the Takahashi reference, the Liechti reference, and the Farnworth reference do not, either alone or in combination, disclose or

suggest a method of forming vehicle components, comprising integrally forming a friction member on each of a brake disc and/or a clutch plate as recited in new independent claim 9. Therefore, one of ordinary skill in the art would not be motivated to modify or combine the references so as to obtain the invention as recited in new independent claim 9. Accordingly, it is respectfully submitted that new independent claim 9 and the claims that depend therefrom are clearly patentable over the prior art of record.

New independent claim 18 is directed to a vehicle component that comprises at least one of a brake disc and a clutch plate, and comprises a friction member integrally formed on each of the brake disc and/or clutch plate. The friction member includes a body of PMMC material including an Al-alloy matrix material and ceramic reinforcing particles embedded in the matrix material.

As explained above with respect to independent claim 9, the Isoyama reference, the Bader reference, the Takahashi reference, the Liechti reference, and the Farnworth reference do not, either alone or in combination, disclose or suggest a brake disc and/or a clutch plate, and a friction member integrally formed on each of the brake disc and/or clutch plate, in which the friction member includes a body of PMMC material including an Al-alloy matrix material and ceramic reinforcing particles embedded in the matrix material. Therefore, one of ordinary skill in the art would not be motivated to modify or combine the references so as to obtain the invention recited in new independent claim 18. Accordingly, it is respectfully submitted that independent claim 18 and the claims that depend therefrom are clearly patentable over the prior art of record.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance. However, if the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact the Applicant's undersigned representative.

Respectfully submitted,

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October 16, 2003